description of New England which he wrote in 1772: "I thought often of the happiness in New England, where every man is a freeholder, has a vote in public affairs, lives in a tidy, warm house, has plenty of good food and fuel, with whole clothes from head to foot, the manufacture perhaps of his own family. Long may they continue in this situation!" Such was Franklin's conception of a free and happy people. Such was his political philosophy.

The moral philosophy of Franklin consisted almost exclusively in the inculcation of certain very practical and unimaginative virtues, such as temperance, frugality, industry, moderation, cleanliness and tranquility. Sincerity and justice, and resolution—that indispensable fly-wheel of virtuous habit—are found in his table of virtues; but all his moral precepts seem to be based on observation and experience of life, and to express his convictions concerning what is profitable, prudent, and on the whole satisfactory in the life that now is. His philosophy is a guide of life, because it searches out virtues, and so provides the means of expelling vices. It may reasonably determine conduct. It did determine Franklin's conduct to a remarkable degree, and has had a prodigious influence for good on his countrymen and on civilized mankind. Nevertheless, it omits all consideration of the prime motive power, which must impel to right conduct, as fire supplies the power which actuates the engine. That motive power is pure, unselfish love—love to God and love to man. "Thou shalt love the Lord thy God with all thy heart * * * and thy neighbor as thyself."

Franklin never seems to have perceived that the supreme tests of civilization are the tender and honorable treatment of women as equals, and the sanctity of home life. There was one primary virtue on his list which he did not always practise. His failures in this respect diminished his influence for good among his contemporaries, and must always qualify the admiration with which mankind will regard him as a moral philosopher and an exhorter to a good life. His sagacity, intellectual force, versatility, originality, firmness, fortunate period of service, and longevity combined to make him a great leader of his people. In American public affairs the generation of wise leaders next to his own felt for him high admiration and respect; and the strong republic, whose birth and youthful growth he witnessed, will carry down his fame as political philosopher, patriot and apostle of liberty through long generations.

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AN EMPIRICAL STUDY OF COLLEGE ENTRANCE EXAMINATIONS.

EVERY one who is acquainted with the present arrangements for admission to college through entrance examinations recognizes the need for accurate information concerning the exact function served by them. The expenditure of energy by students and teachers in the course of specific preparation for these examinations, by students and their parents in worry before and after, by college admission boards in preparing, giving, scoring and recording such examinations is obvious. The opinions of supposedly equally competent observers range from certainty that such examinations have no correspondence with intellectual merit to equal certainty that they are a reliable measure of fitness for college and a chief safeguard of the standards of collegiate work. The practises of the fifty most efficient colleges in the country vary from a practically absolute requirement of such examinations as the condition of entrance to the freshman year to an exemption of almost every candidate from any such examination.

The present report will not offer any opinions concerning the general rationality

of the arrangements for entrance to American colleges, but will give without comment or inferences the facts concerning the actual significance of a student's achievement in entrance for his later achievement in college work, and also certain facts of importance concerning the entrance marks themselves.

I have recorded the entire entrance record and the entire college record through 1905 of every student entering Columbia College in 1901, 1902 and 1903 who took in whole or in part the entrance examinations given by the College Entrance Board of the Association of Colleges and Preparatory Schools of the Middle States and Maryland. These facts enable one to measure precisely enough for all practical purposes the relationship between success in the entrance examinations (in any one or in any combination of subjects) and success in college (in any one subject or year or combination of subjects or of years).

I shall, for the sake of brevity, refer here only to the 130 students for whom I have complete records through junior year. For each of these I have such a record as the following:

INDIVIDUAL X.

Entrance.

	Credited.
English: Reading,	
Study,	80
Latin: Grammar,	62.5
Composition,	60
Cicero,	62.5
Vergil,	95
Sight Translation,	95
Greek: Grammar,	73
Composition,	75
Xenophon,	73
Homer,	90
French: Elementary,	78
Mathematics: Algebra to Quadratics,	100
Quadratics,	100
Plane Geometry,	97

College.

Freshman: English,	C
Latin,	D
Mathematics,	B
German,	C
Physics,	D
Sophomore: English,	C and D
Latin,	B
Mathematics,	C
History,	C
Physics,	C
Junior: English,	D and C
German,	F
Economics,	F
History,	A and B

In transmuting the A, B, C records into more convenient quantities I have taken $A = 6$, $B = 4$, $C = 3$, $D = 1$ and $F = 0$. Perhaps $A = 10$, $B = 7$, $C = 5$, $D = 2$ and $F = 0$ would be a trifle closer to the real values of these conventional measures of relative position. The entrance scores have been used in their original form. The use of marks given in the conventional way by examiners or instructors as measures of either quantity of ability or relative position in comparison with other students is a matter involving many complex and delicate questions of statistical method. A too naïve procedure may introduce variable and constant errors of considerable moment. It would take too long to defend the author's methods and would interest only the critical student of mental measurements. Suffice it to say that the author is cognizant of the problems and will state no result which would have been essentially changed by the adoption of any rational method of treating the marks.

The most important question is, of course, the general relation between standing in entrance examinations and standing in college work. The facts are given in Tables I., II., III. and IV. The relationship is only moderate even in the case of the work of freshman year and dwindles steadily, the coefficients of correlation be-

ing in order .62, .50, .47 and .25. An examination of the tables and individual records reveals such facts as the following:

Tables I., II., III. and IV. show for each individual the relation between entrance standing and college standing. Horizontal position denotes the rank

TABLE I.

Entrance Mark.

Mark of Senior Year.	60	65	70	75	80	85	90	95
4	1							
5								
6								
7								
8								
9								
10							1	
11								
12								
13								
14								
15		1	1	1				
16			1	1 1				
17					2			
18					1			
19			1		1 1		1	
20		1		1	1 1		1	
21	1		1	1 1	1	1		
22	1		1	1	1	1		
23								
24	1 1			2				
25				1				
26					1 1			
27			1					
28			1		1		1	
29								
30			1	3	1 3			1

TABLE II.

Entrance Mark.

Mark of Junior Year.	60	65	70	75	80	85	90	9
6	1							
7			1					
8								
9				1 1				
10	1	1						
11		2	2		1			
12								
13		1 1	1				1	
14			1 1	1				
15	1			1	1			
16	1 1	1 1	2 1 1		1 1			
17			3 1	1	3 1			
18	1 1		1		1 1	1		
19	1		4		3			
20		2 1	3 1	1	2	1	1	
21		1	1				1	
22	1 1			1	3 1 1	1 2	1	
23								
24		1	3 1		1 1	1	1	
25						1		1
26			1	1			1	
27								
28	1			3	3	2 1 1		1
29								
30	1		1 1		1 1 1		2 1	1

in entrance (the median of the highest eleven marks obtained); vertical position denotes the rank in college studies (the average of the five highest marks obtained—in senior year in Table I., in junior year in Table II., etc. Each figure entered in the table means so many students. Thus in Table I. the 1 at the upper left-hand corner means that one student scoring 60 in entrance scored 4 in the college work of senior year. The other 1 in the same column means that one

TABLE III.

Entrance Mark.

Mark of Sophomore Year.	60	65	70	75	80	85	90	95
1		1	1	1				
2								
3								
4				1				
5			1	1				
6								
7			2		1			
8	1		1	1	1			
9		1		2	2			
10	1		1	1				
11		1		2				
12				1 1	1			
13		1		1 1	1 1		1	
14	1	1 1		3				
15		1	1 1	5 1	1			
16	1		1	2 1		1	1	
17		1		2	1			1
18	1 1			3 1 1	1 1	4 1	1	
19				1 1	3	2 1	1 1	
20			1	2 1	2	4		
21			1 1	2		1		
22				1	1	1 2 1 1	1	
23	1				2			
24				2	2	1 2	1 1	
25						1 1		
26						1 3 1	4	2
27		1						
28	1			1	1		1	1 1 1 1
29								
30				1			1	2 1 1

TABLE IV.

Entrance Mark.

Mark of Freshman Year.	60	65	70	75	80	85	90	95
3								
4	1	1						
5		1	1					
6		1	2 1	2				
7			1	1				
8				1	1			
9	1	1		1	1			
10				1	3	1		
11	1 1	1	1	1 1				
12	1 1		1 6	1	1	1		1
13	1		1 1	1 1	3			
14	1 1		2	1 2	3 1		1	1
15	1			2 1	2	1		
16		1		1 1	2	1	2	
17		2		1 2 1	2	1 1		
18		1		1 1 1	1	4 1		1
19				2	1	3 1		
20			1	2	1	3	2 1 1	
21			1	1 1 2	1	3	1	
22	1 1				1	1		1
23				1	1 2		1	1
24				1		1	2 1	1
25								
26			1	1		1 1	1 1	1
27					1			
28					1		1	1
29								
30						1		2 1 1

student scoring 60 in entrance scored 21 in college work. The 1 in the next vertical column means that one student scoring 61 in entrance, scored 24 in college work. The vertical column under 70 would read:—Of 10 students each ranking

70 in entrance examinations, one ranked 15 in the college work of senior year, one 16, four 18, one 19, one 21, one 22 and one 27.

The values 60, 61, 62, etc., up to 95 of the horizontal scale are directly obtained from the entrance marks which are given on the ordinary scale of from 100 down. The values 4, 5, 6 up to 30 of the vertical scale are obtained from the college records of A, B, C, D and F by taking A = 6, B = 4, C = 3, D = 1 and F = 0. Thus 30 = five A's, 28 = four A's and one B, 27 = four A's and one C, 26 = three A's and two B's, 25 = three A's, one B and one C, or four A's and one D, etc.

Six students out of the 130 received the same average entrance mark, 61. In their college work of junior year one averaged a trifle above D, one half way from D to C, one a little above C, and two received A in four subjects out of five and B in the other. In freshman and sophomore year the range was nearly as great.

Eleven students of the 130 received in the entrance examinations marks averaging 70 in each case. In their college work of junior year they averaged all the way from D to A.

Of the students who were in the lower half of the group in the entrance examinations nearly forty per cent. are found in the upper half in the last three years of college.

Of the dozen students who ranked highest in entrance, some were in the lowest fifth of the class by junior year.

If, knowing that 50 individuals ranked in the order Jones, Smith, Brown, etc., in their entrance marks, one were to wager that in the college work of, say, junior year, they would rank Jones, Smith, Brown, etc., as before, he would lose his bet in 47 cases out of the 50.

The record of eleven or more entrance examinations gives a less accurate prophecy of what a student will do in the latter half of his college course than does the college record of his brother! The correlation between brothers in intellectual ability is approximately .40, but that between standing in entrance examinations and standing in college is only .47 for junior year and .25 for senior year.

The lack of perfect correlation between standing in entrance examinations and standing in, say, junior year of college is presumably due to several causes. First, the relative standing of a boy among his fellows in any mental capacity or combination of capacities varies from year to year. That is, the correlation between John's condition in 1900 and John's condition in 1903 is not perfect. In the second place, the standing in entrance does not even ostensibly measure the same capacities as does his standing in junior year. This accounts for part of the lack of correlation because there is a general departure from perfect correlation amongst different capacities in the same individual, for instance between mathematics and the rhetorical gifts. In the third place, the entrance record is not a perfect measure of the capacities it ostensibly measures. Hence the relation of the two facts, entrance mark and college mark, is not so close as the relation between entrance ability and college ability would be.

This analysis is of no significance so far as concerns the adequacy of the entrance examinations as a test of fitness for college, but it is important when such facts as those presented here are used in reasoning about the general problems of individual and genetic psychology.

It is possible from the data to answer the question, "Of the examinations in the different entrance subjects, which is most prophetic of an individual's success in college work?" The author hopes to make the necessary calculations when he has 150 or more records complete through senior year. A rough treatment of the facts in the case of English, Latin, mathematics and science shows no impressive differ-

ences; so far as the facts go they show a slight advantage in favor of the science examinations and a slight inferiority of the mathematics examination. The facts are given in Table V.

The reliability of any one single examination mark from the dozen or more given as the test for entrance is practically important because the disrepute into which entrance examinations have fallen in the opinion of high school teachers is largely due to the failure in some examination of a pupil known to be of first-rate ability in the subject. I give in Table VI. the facts concerning the relation of the entrance mark in Vergil of one class to achievement in college Latin courses as a sample. The correlation as calculated is almost zero.

It is the opinion of many sagacious observers that one defect of the traditional entrance examinations is that they measure the cleverness of the student's coaching rather than his own fundamental capacities. This hypothesis as it stands can not be tested by my records without the additional knowledge of the cleverness of each candidate's coaching. But the general fact that the entrance examinations do not measure at all accurately the candidate's capacity can be demonstrated from two lines of evidence—the great variability of the marks of the same individuals in different special branches of the same subject (such as—Vergil and Cicero in Latin) and in precisely the same subject, in the case of examinations repeated because of initial failure.

TABLE V.

Class of 1905. Correlation of Separate Entrance-Subjects with College Work.

	Latin		English and History		Mathematics		Science	
	Entrance	N.	Entrance	N.	Entrance	N.	Entrance	N.
Freshman marks,	.31	(80)	.43	(84)	.48	(84)	.84	(34)
Sophomore marks,	.40	(73)	.43	(77)	.19	(77)	.73	(33)
Junior marks,	.43	(66)	.51	(68)	.28	(68)	.43	(28)
Senior marks,	.59	(56)	.25	(56)	.22	(56)	.19	(23)
Average,	.43		.40		.30		.55	

TABLE VI.

Class of 1901. Correlation between Entrance Mark in Vergil and College Work in Latin.

College Work in Latin.	Entrance Mark in Vergil.																														
	34	36	38	40	42	44	46	48	50	52	54	56	58	60	62	64	66	68	70	72	74	76	78	80	82	84	86	88	90
F											1			1															
D																2	1	1	1	1						1			
D																								1					
D								1																					
D																1													
C														2		2	1	2	3	1	2	1	3	2	1	3			1
C															1	1													
B	1													4	1	1			1		1		2			4			1
B																			1				1						
B																		1											
A				1												1			1		1	1							

The average range of difference of the examinations repeated because of initial failure.

TABLE VII.

Range of Difference of the Same Individual's Separate Entrance Marks in Latin. Only last trials used. Class of 1905.

Amount of Difference.	Frequency.	Amount of Difference.	Frequency.
0– 4	1	40–44	3
5– 9	2	45–49	3
10–14	10	50–54	3
15–19	16	55–59	2
20–24	11	60–64	4
25–29	6	65–69	3
30–34	8	70–74	3
35–39	8	75–79	1

TABLE VIII.

Difference between First and Last Trials of an Entrance Examination. Class of 1906.

Number of Points Difference.	Frequency.	Frequency in English Examinations.	Frequency in Latin Examinations.	Frequency in French Examinations.	Frequency in Mathematics Examinations.
0	2		1		1
1					
2	2	1			1
3	3		1		2
4	2			1	1
5	3	1		2	
6	3	1		1	1
7	4	1		2	1
8	2	1			1
9					
10	9	3	4		2
11	3		1	2	
12	2			1	1
13	2	1	1		
14					
15	8	3	3	1	1
16					
17	3		2	1	
18	2	1			1
19	5	2		2	1
20	5	2	3		
21	2				2
22	3		1		2
23	1				1
24	1	1			
25	7	1	6		
26	1	1			
27	2			1	1
28	4			2	2
29	2			1	1
30	8		3	3	2
31	1				1
32	2			1	1
33	3			1	2
34	2		2		
35	5		4		1
36	4	1	1	1	1
37	4	1	3		
38	4	1	1	2	
39	1			1	
40	5	1	1		3
40–49	10		3	3	4
50–59	5	3	1		1
60–69	3				3

marks of an individual's separate examinations in Latin, for instance, was over 30 in the case of the class of 1901, the distribution of these differences being given in Table VII. (the scale of marking being always the common one from 100 down).

In 140 cases of repeated examinations chosen at random the average difference between a candidate's first and his second trial of precisely the same examination was over 22, the distribution of these differences being given in Table VIII.

It should be noted that this defect (not measuring capacity) of the examinations of the Middle States Board probably exists to a greater extent with the examinations given independently by single colleges, for in the former case the examination questions are planned and the papers rated with great care. The eccentricities of individual examiners play a relatively minor rôle, and the nature of the examination can probably not be prophesied in advance so accurately as in the case of the examinations arranged by some one college.

The inaccuracy of prophecy of achievement in college from achievement in entrance examinations becomes intolerable in individual cases. For instance, there were 10 men out of the 130 who in their junior year got A (the highest mark given) in at least five studies. Their average marks at entrance were in some cases in the lowest tenth of the 130, barely above the passing mark. Had the passing mark been set the least bit higher, one of the very best students of the three college classes would have been debarred from entrance. There is every reason to believe that of those students who did yet worse in the entrance examinations and so were shut out, a fairly large percentage would have done better in college than a third of those who were admitted. Sooner or later some one will be barred out who would have been the best man of his class.

The inferences concerning the inadequacy of the traditional entrance examinations as tests of merit and their great injustice in many individual cases are too obvious to need comment. The author's suggestions for the improvement of the conditions of entrance to eastern colleges have been stated briefly in the *Educational Review* for May, 1906.[1] In place of any practical suggestions I may be allowed to call attention to the general problem of which the college-entrance problem is but one particular instance.

The whole matter of the means of selecting students for continued education is in great need of scientific study. Pupils are eliminated from special forms of education and from formal education of any sort at all ages and by all sorts of arbitrary selective agencies, some permitted and others deliberately created by our educational system. The traditional college entrance examination is but one of a hundred agencies that decide which individuals shall progress to a given kind of educational opportunity.

In an ideal system these agencies would secure to each individual continued education to such extent and in such directions as would be for the greatest welfare of the most deserving. Under present conditions they are at times administered to suit the personal convenience of school principals, college faculties and the like, and are almost always administered without the guidance of scientific knowledge. It is the duty of scientific men to apply the same methods of thought to this question of social policy that they would demand in their special science.

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[1] The gist of these was the recommendation that schools be credited on the basis in each case of a systematic record of the actual success *in college* of candidates endorsed in the past by the school, the records of success in college being sent in from all colleges to some central board.

SCIENTIFIC BOOKS.

Methods of Organic Analysis. By HENRY C. SHERMAN, Ph.D., Adjunct Professor of Analytical Chemistry in Columbia University. New York, The Macmillan Co. 1905.

In this volume of 240 pages is comprised a very considerable amount of information regarding methods of proximate organic analysis. An idea of the scope of the work may be gained from an enumeration of the topics treated. Methods of ultimate organic analysis, analysis of ash, the determination of the nitrogen, sulphur and phosphorus of organic compounds, are first taken up. This preliminary treatment is followed by descriptions in considerable detail of selected methods for the estimation and examination of such classes of organic bodies as alcohols, aldehydes, carbohydrates, acids, oils, soaps, proteids and milk. Special prominence is given to processes bearing on food analysis.

Commendable features are: the free use of references, in the form of both foot-notes and bibliographical compilations; the carefully worked-out procedures; the clear and pertinent notes and discussions. The isolated student or casual worker in methods of organic analysis will find the book of especial value in pointing out original and often scattered sources of information.

Naturally there are some particulars in which every chemist would not coincide with the author's experience or conclusions. Such, for example, are the rather unsatisfactory methods described for the detection of borates and of fluorides on pages 232 and 233, and the summary way in which the two common methods for estimating fusel oil are dismissed as equally unsatisfactory (p. 35). It would have been of interest to food analysts, especially, to have had something from the author's experience with either of these two methods. Such minor points, however, de-